

PHNL030906

PCT/IB2004/051254

16

CLAIMS:

1. An audio conditioning apparatus (190) for conditioning an audio signal (O) to be output, comprising:
 - a noise characterizing unit (106, 112) arranged to evaluate a noise level (NM) of environmental noise; and
 - 5 - a volume amplification unit (140) arranged to amplify a volume of the audio signal (O) by a volume gain (GV), depending on the noise level (NM), characterized in that
 - a further noise characterizing unit (110, 116) , (108,114) is comprised, arranged to evaluate a further noise level (NL or NH) of the environmental noise in a bass frequency noise band (111) or a treble frequency noise band (109), and
 - 10 - a further amplification unit (150 or 152) is comprised, arranged to amplify by a further gain (GB or GT) the amplitude of frequency components in a bass frequency audio band (202) respectively a treble frequency audio band (206) of the audio signal (O), in dependence of the further noise level (NL respectively NH).
- 15 2. An audio conditioning apparatus (190) according to claim 1, wherein an upper limit of the bass frequency audio band (202) substantially lies in the range of 60 to 150 Hz, and wherein a lower limit of the treble frequency audio band substantially lies in the range of 8kHz to 12 kHz.
- 20 3. An audio conditioning apparatus (190) according to claim 1, wherein a gain consistency unit (124, 126, 128) is comprised arranged to yield a gain (GV, GB, GT) consistently varying in time, according to a predetermined mathematical criterion.
4. An audio conditioning apparatus (190) according to claim 1, wherein gain
25 dispatcher unit (134) is comprised, arranged to allocate a maximum allowable gain (GMV, GMB, GMT), on the basis of available headroom for amplification.
5. An audio conditioning apparatus (190) according to claim 1, wherein the further amplification unit (150 or 152) comprises a shelving filter.

PHNL030906

PCT/IB2004/051254

6. An audio conditioning apparatus (190) according to claim 1 connectable to a headphone loudspeaker usable for reproduction of the audio signal (O), wherein an active noise canceling unit (540) is comprised arranged to substantially cancel environmental noise in a cancellation band of frequencies, the noise being measurable by a microphone (104).
7. An audio conditioning apparatus (190) according to claim 6, wherein a distance measuring device (599) is comprised arranged to measure a distance between the microphone (104) and the headphone loudspeaker.
8. An audio reproduction apparatus, comprising:
- a loudspeaker (160) for reproduction of the audio signal (O);
 - an access (102) to an input audio signal (i) on which the audio signal (O) is based; and
 - an audio conditioning apparatus (190) as claimed in claim 1.
9. A method of conditioning an audio signal (O), comprising:
- evaluating a noise level (NM) of environmental noise; and
 - amplifying a volume of the audio signal (O) by a volume gain (GV),
- depending on the noise level (NM), characterized in that
- a further noise level (NL or NH) of the environmental noise in a bass frequency noise band or a treble frequency noise band is evaluated, and
 - the amplitude of frequency components in a bass frequency audio band respectively a treble frequency audio band of the audio signal (O) is amplified by a further gain (GB, GT), in dependence of the further noise level (NL, NH).
10. A computer program product enabling a processor to execute the method of claim 9.